Article was published in ARMY Acquisition, Logistics & Technology Magazine
October - December 2006 Issue

Lean Goes to War

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On Sept. 11, 2001, the world as we once knew it changed forever. Little did Letterkenny Army Depot (LEAD), PA, realize it was about to undergo a major transformation in the way it had been doing business. "Lean Goes to War" exemplifies the art of the possible when both management and workers' philosophies are focused on making changes in business models. The key to making new processes work is by having the workforce, including union leadership, believe in it. Once workers "buy in" to the Lean Six Sigma process championed by Toyota, organizations can truly eliminate waste, redundant or obsolete functions and work toward achieving greater efficiencies and sound manufacturing processes.

The Avenger system features a gyro-stabilized air defense turret mounted on a modified heavy Humvee. It is a highly mobile and transportable surface-to-air missile/gun weapon system. The turret has two Stinger missile launcher pods, each capable of firing up to four fire-and-forget infrared/ultraviolet guided missiles in rapid succession. Avenger is operated by a 2-man crew for defense against helicopters and fixed-wing aircraft at low altitude, day or night, in clear or adverse weather. The Avenger first entered military service in 1989, and saw considerable service in 2003 during the march to Baghdad, Iraq, at the outset of *Operation Iraqi Freedom*. The air defense systems are in desperate need of reset due to prolonged years of usage in the tough desert environment. LEAD has undertaken the refurbishment process and has already saved the Army an estimated $1 million in reset costs. (U.S. Army photo.)

Toyota developed the Toyota Production System that applied Lean manufacturing concepts and skyrocketed Toyota's status and automobile sales as the world's leading automobile manufacturer. Lean, ultimately, is a philosophy for deciding what products and services to provide and how to provide them in a rapid, efficient manner. Letterkenny has since successfully adopted the same Lean techniques to provide greater support to an Army that's transforming while at war.

With the onset of *Operations Enduring* and *Iraqi Freedom* (*OIF*) in Southwest Asia, organic depots were called upon to answer our warfighter's immediate needs. Described in some circles as being as agile as a 3-legged turtle, the depots had to transform to meet the increasing demands of an Army prosecuting a global war on terrorism (GWOT). The management's challenge was simple — how do you transform a 3-legged turtle into a thoroughbred racehorse overnight?

LEAD started its journey in 2002 when then Depot Commander COL William Guinn introduced the Lean concept. The original intent was to improve depot maintenance processes to attract new customers. As the depot transformed into "a capabilities-based depot," it was imperative the depot provide its customers the "biggest bang for their buck."

LEAD Prepares for War

In early FY03, LEAD experienced its first opportunity to apply Lean concepts in support of the GWOT. We all remember the television news images of U.S. special operations Soldiers riding horses and camels into war in Afghanistan. The U.S. Army Special Operations Command (USASOC) had designed a specially modified Humvee known as the Ground Mobility Vehicle (GMV) to provide a fighting platform for the anticipated invasion of Iraq. As the inevitability of war crept nearer, USASOC turned to a trusted friend to accelerate GMV production.

LEAD had established a special relationship with USASOC in 1998 with the production of GMV kits for the specially modified Humvees. When the Special Forces advisors made their urgent request known to LEAD, the depot decided to employ its newly formed Lean team to make improvements in the GMV process. The first task was to transform the depot's existing GMV

LEAD is resetting the Patriot systems returning from the war to ensure they are combat ready for future deployments. Here, Soldiers from the 31st Air Defense Artillery Brigade prepare to convoy their Patriot missile launchers from Ahmed Al Jaber, Kuwait, into southern Iraq to support ongoing operations. (U.S. Air Force photo by TSGT James D. Mossman.)

maintenance and rebuild production line. The initial goal was to modify new Humvees into GMVs with a 10-week turnaround. Before the project could be completed, urgent requirements quickly changed turnaround time to just 3 weeks.

As USASOC's requirements changed, LEAD successfully ramped up production to 24 vehicles per week, and turnaround time from a vehicle coming in the door to that same vehicle going back out the door was reduced from 10 weeks to 3 weeks to just 8.8 days. In addition to providing warfighters with vehicles more quickly, LEAD also remanufactured the GMVs more efficiently, returning a $990,000 savings to the customer. Through successful implementation of Lean principles, LEAD reduced its production floor plan by 50 percent as well. When LTG Philip Kensinger, then USASOC Commanding General (CG), was presented with a ceremonial check, he requested that LEAD produce more vehicles at no cost to his command. LEAD produced 18 more GMVs with the savings generated, thereby providing additional fighting capability to USASOC that was previously unfunded.

This early success indicated that a change in management philosophy was also paramount. The depot needed a Strategic Business Plan and a business office to facilitate Lean. That task went to Mark Sheffield who was leading the depot's quality initiatives at the time. Sheffield, who is now the Chief of Staff, explained, "We built an 8-person team drawn from throughout the installation. We looked at the range of issues, problems and opportunities, from personnel and production to financial and cultural. We had to know if we had the right number of people with the right skills, how to improve production and work flow, and if we were accurately capturing costs. We focused on our customer — the Soldier — and how we could better support him or her in the field. We wanted to use Lean to develop a flat, team-based structure with a high degree of work autonomy." He continued, "A Lean organization breaks down barriers and develops highly trained, motivated employees who investigate problems and find solutions as part of their job, and that's what we wanted to become."

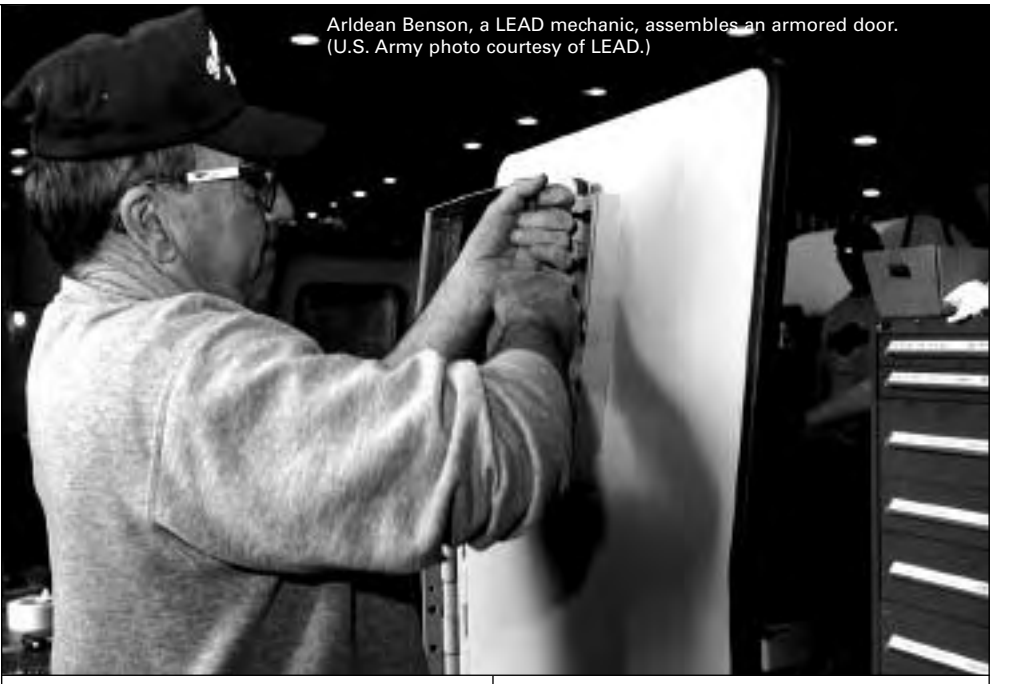
Achieving Results

The original strategy established in October 2002 was to initiate Lean in the depot's core mission. The Patriot Recapitalization (recap) program is designed to bring the ground support system to near zero hours/miles. LEAD is responsible for the recap of one battalion per year. In FY03, LEAD transformed its Patriot Launcher Rebuild

Program into a Lean operation. After a value stream analysis was completed, LEAD executed seven Rapid Improvement Events.

Once again, LEAD was able to generate a significant savings for its customer. The depot presented a ceremonial check of $1.2 million to COL Tommy Newberry, Project Manager, Patriot Lower Tier Project Office (LTPO), recognizing these savings. When presented with the check, Newberry remarked, "Letterkenny is the first depot to achieve these accomplishments, and they are to be commended for sharing these savings with us." Ultimately, the warfighter benefited from the changes implemented at LEAD. Newberry asked the depot to overhaul four additional Patriot launchers that had not been funded in his program. The process resulted in the following:

- Reduced 23,334 direct labor hours per year.
- Generated $11.9 million in U.S. Army Aviation and Missile Command (AMCOM) LTPO savings.
- Redeployed 24 people to other functions.
- Eliminated 1,155 miles per year in travel.
- Freed 1.2 acres of floor space for other projects/ programs.



Arldean Benson, a LEAD mechanic, assembles an armored door. (U.S. Army photo courtesy of LEAD.)

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Breaking the Paradigm

LEAD was truly in a transformation mode and wanted to find new areas to employ Lean concepts. By this time, *OIF* was in full swing and Baghdad, Iraq, had just fallen. The Scud missile and air threat had been eliminated and the depot's attention was turned to resetting both Patriot and Avenger systems returning from the war. LEAD decided to incorporate Lean concepts in the initial planning sessions for the reset missions. This meant a shift in traditional thinking, and required a virtual view of what a reset line would look like and the engagement of Lean prior to the induction of assets. A Lean team member was dispatched to Fort Bliss, TX, to establish the reset line.

The results were astounding. Team Letterkenny successfully reset three Patriot battalions eight weeks ahead of schedule. The turnaround time was critical to the redeployment schedule of the air defenders LEAD was supporting. LEAD completed these missions ahead of schedule and saved the customer a whopping $1.5 million in the process. The final product was a revitalized Patriot air defense system that Soldiers could trust to accomplish their respective missions.

Patriot and Avenger benefited from the application of Lean efforts at LEAD. The Avenger had seen considerable action during the march to Baghdad. The air defense systems were sandblasted by windstorms, and many had suffered battle and transportation damage. Lean events were conducted and substantial changes were made in the assembly and disassembly processes. The Lean concept eliminated unnecessary steps in the refurbishment process and created a "parts supermarket" close to the work cells. The Avenger reset program saved the Army another $1 million.

LEAD implementation of Lean returned Patriot and Avenger missile systems back to the field faster than expected and provided a total of $2.5 million to the customer to be used to support other unfunded requirements associated with the GWOT.

Mike Plasterer uses a laser cutting machine at LEAD to cut steel plate. (U.S. Army photo courtesy of LEAD.)

Floor Space Generated

Lean cuts waste, consolidates operations and, in turn, generates free floor space. The additional floor space was critical as the depot worked quickly to bring in "new missions" to support combatant commander requirements. A phenomenal 64,000 square feet of floor space was created after Lean improved the Patriot recap process. The 64,000 square feet of floor space then became available for the new workload. The money generated from this new workload amounted to $166 million. Several mission areas that directly supported Soldiers on the front lines were: chemical-biological, Army Humvee recap, generator rebuilds, deployable tent city or Force Provider and multiple add-on-armor kit programs.

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Armor Programs

Letterkenny quickly put the additional floor space to good use. The first involved an urgent call for armor boxes that were used in the battle for Fallujah, Iraq. The armor plating for these trucks arrived on a Friday night, was cut over the weekend and was delivered for ballistic testing to Aberdeen Proving Ground, MD, in less than 72 hours. LEAD implemented a true Lean "pull system" to produce 36 of these boxes in less than 14 days.

The next call was for Humvee armor door kits. LEAD was initially asked to produce 410 kits. Lean concepts were incorporated into the production system. Weekly output increased by 200 percent. The one-piece flow allowed changes in the configurations to be immediately implemented in the production run. LEAD was then asked to increase its production to 860 Humvee armor door kits. The last of the armor door kits was produced a full two weeks ahead of schedule.

Armor Soldier Protection

Other up-armor projects followed. The M969 5,000-gallon tanker provided a new challenge with the variety of design changes. However, LEAD produced 150 of these kits, and plans are underway to produce more of this armor. Each kit contained 82 pieces and weighed more than 2,400 pounds. The letter of intent to build the kits was received on Nov. 19, 2004, and the last kit was completed Jan. 21, 2005. The M969 kits were completed 4 weeks ahead of schedule and $1 million under budget. Lean manufacturing rapidly became an integral part of the depot's planning efforts.

As the depot transformed into "a capabilities-based depot," the word spread that LEAD gives its customer the "biggest bang for their buck." Soon the depot was asked to produce M939 armor cabs for the 5-ton truck. LEAD began with a modest production rate of five kits per week in January 2005. The kit included 382 pieces and weighed 5,870 pounds. By using Lean processes, production was steadily increased to 25 kits per week while using the same amount of floor space. Based upon the accelerated production rate, LEAD was asked to produce 70 percent more kits above the original program. The 400th cab

MG Pillsbury, AMCOM CG, addresses LEAD employees after the depot won the Shingo Prize for Excellence in Manufacturing. (U.S. Army photo courtesy of LEAD.)

was completed in early July 2005.

A significant development from the Lean armor processes was the use of a "pull system." Workers did not walk back and forth for parts or tools. Everything they needed for the process was located beside their work areas in carefully marked bins. Using Lean tools enabled the depot to provide quality products to our warfighters ahead of schedule and under cost.

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Shingo Public Sector Prize

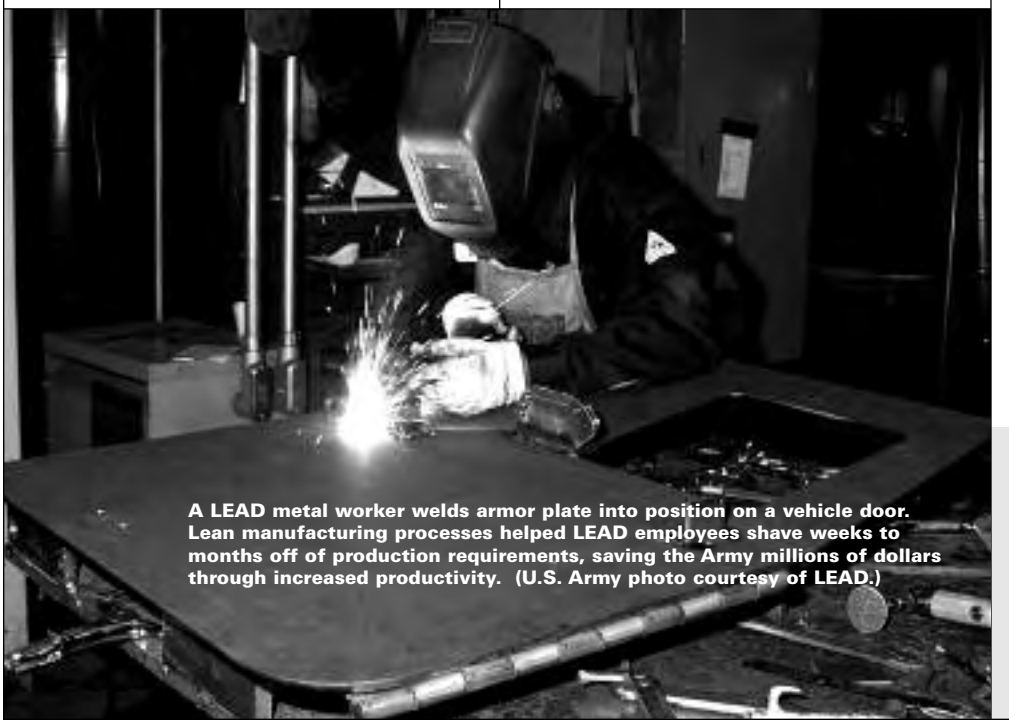
In October 2005, Letterkenny was recognized as the Army's first-ever winner of the Shingo Prize for Excellence in Manufacturing. The prize was established in 1988 to promote excellence in manufacturing, but was not made available to the public sector until 2005. The Shingo Public Sector Prize was established to "recognize entities in the United States that have demonstrated outstanding achievements in manufacturing/MRO [Maintenance, Repair and Operations] and the supporting business processes leading to outstanding quality, cost, delivery and business/financial results." The 3-legged turtle had won the coveted prize referred to by *Business Week* as "the Nobel prize of manufacturing."

(From left to right) Dr. Ross Robson, Executive Director, Shingo Prize, Utah State University; LTG William E. Mortensen, Army Materiel Command Deputy CG; Congressman Bill Shuster; MG Pillsbury, AMCOM CG; and COL Robert A. Swenson, LEAD Commander; accept the Shingo Prize at a LEAD ceremony on Feb. 14, 2006. (U.S. Army photo courtesy of LEAD.)

While attending Shingo Prize celebration ceremonies at LEAD, AMCOM CG MG James H. Pillsbury spoke to the men and women who work at LEAD, "Let me tell you something, this is a big deal! This is the first time a public sector Army depot has won a Shingo Award. You have taken the Patriot, the most complicated war system the Army has, and fixed it." Pillsbury acknowledged the use of Lean in providing support to the warfighters. "Letterkenny has been able to put equipment in Soldiers' hands at the right time, in the right amount and in the right quality. … You do it better. You do it better every day. I couldn't be prouder to be part of the team."

The Journey Continues

Today, Toyota continues to use the Toyota Production System in its quest to maintain its worldwide reputation as the leading manufacturer of quality automobiles. LEAD also continues to use Lean to provide greater value and responsiveness to the Nation's warfighters. LEAD has continued to return savings to its customers, increase throughput and respond to customer needs faster, better and cheaper. We are a Nation at war and our warfighters deserve the very best.



A LEAD metal worker welds armor plate into position on a vehicle door. Lean manufacturing processes helped LEAD employees shave weeks to months off of production requirements, saving the Army millions of dollars through increased productivity. (U.S. Army photo courtesy of LEAD.)

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